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Dividends From Wood Research

Recent Publications
January–June 1999

Explanation and Instructions

"Dividends From Wood Research" is a semiannual listing of recent publications resulting from wood utilization research at the Forest Products Laboratory (FPL). These publications are produced to encourage and facilitate application of Forest Service research. This issue lists publications received between January 1 and June 30, 1999.

Each publication listed in this brochure is available through at least one of the following sources.

Available from FPL (indicated by an order number before the title of the publication): Quantities limited. Circle the order number on the blank at the end of the brochure and mail or fax the blank to FPL.

Available through the Internet: Listed publications are available as PDF documents for viewing or printing from FPL's web site (<http://www.fpl.fs.fed.us/>).

Available through sales outlets: Major sales outlets are the Superintendent of Documents, the National Technical Information Service (NTIS), and various private publishers. Order directly from the outlet.

Available through libraries: Research publications are available through many public and university libraries in the United States and elsewhere. U.S. Government publications are also available through many Government Depository Libraries. Check with a major library near you to determine availability.

List of Categories

Publications are listed in this brochure within the following general categories.

- Biodiversity and Biosystematics of Fungi
- Decay Processes and Bioprocessing
- Durability
- General
- Papermaking and Paper Recycling
- Properties and Use of Wood, Composites, and Fiber Products
- Recycling of Wood Products
- Surface Chemistry
- Timber and Fiber Demand and Technology Assessment
- Wood Chemistry
- Special Item

Biodiversity and Biosystematics of Fungi

Assessment of Compatibility Among *Armillaria cepistipes*, *A. sinapina*, and North American Biological Species X and XI, Using Culture Morphology and Molecular Biology

Banik, Mark T.; Burdsall, Harold H. Jr.
1998. *Mycologia*. 90(5): 798–805.

***Alboleptonia* From the Greater Antilles**

Baroni, Timothy J.; Lodge, D. Jean
1998. *Mycologia* 90(4): 680–696.

Distribution and Dispersal of *Xylaria* Endophytes in Two Tree Species in Puerto Rico

Bayman, Paul; Angulo-Sandoval, Pilar; Báez-Ortiz, Zoila; Lodge, D. Jean
1998. *Mycol. Res.* 102(8): 944–948.

Ribosomal DNA Internal Transcribed Spacer Sequences Do Not Support the Species Status of *Ampelomyces quisqualis*, a Hyperparasite of Powdery Mildew Fungi

Kiss, Levente; Nakasone, Karen K.
1998. *Current Genetics*. 33: 362–367.

Three Resupinate Hydnaceous Basidiomycetes From Hawai'i

Nakasone, Karen K.; Gilbertson, Robert L.
1998. *Folia Cryptog. Estonica*. Fasc. 33: 85–92.

The Pantropical Genus *Macrocybe* Gen. Nov.

Pegler, David N.; Lodge, D. Jean; Nakasone, Karen K.
1998. *Mycologia* 90(3): 494–504.

A New *Sorokina* (*Leotiales*) From Puerto Rico

Spooner, B.M.; Lodge, D.J.; L'essøe, T.
1998. *Kew Bull.* 53(1): 237–241.

Decay Processes and Bioprocessing

Biopulping: Technology Learned From Nature That Gives Back to Nature

Akhtar, Masood; Lentz, Michael J.; Swaney, Ross E.; Scott, Gary M.; Horn, Eric; Kirk, T. Kent
1998. *In: Competing and cooperating for stakeholder value. Proceedings of the 1998 annual summit of the Technology Transfer Society; 1998 July 26–29; Chicago, IL: 149–157.*

Decay of Wood and Wood-Based Products Above Ground in Buildings

Carll, Charles G.; Highley, Terry L.
1999. J. Testing and Eval. 27(2): 150–158.

Transcriptional Control of *ADH* Genes in the Xylose-Fermenting Yeast *Pichia stipitis*

Cho, Jae-Yong; Jeffries, Thomas W.
1999. Appl. Environ. Microbiol. 65(6): 2363–2368.

Brown-Rot Wood Decay—Insights Gained From a Low-Decay Isolate of *Postia placenta*

Green, Frederick III; Highley, Terry L.
1997. Trends in Plant Pathology. 1: 1–17.

Extracellular Free Radical Biochemistry of Ligninolytic Fungi

Hammel, Kenneth E.
1996. New J. Chem. 20: 195–198.

Bioconversion of Secondary Fiber Fines to Ethanol Using Counter-Current Enzymatic Saccharification and Co-Fermentation

Jeffries, Thomas W.; Scharfman, Richard
1999. Davison, Brian H.; Finkelstein, Mark, eds. Proceedings, 20th symposium on biotechnology for fuels and chemicals; 1998 May 3–7; Gatlinburg, TN. Appl. Biochem. Biotechnol. 77–79: 435–444.

Biodegradative Mechanism of the Brown Rot Basidiomycete *Gloeophyllum trabeum*: Evidence for an Extracellular Hydroquinone-Driven Fenton Reaction.

Kerem, Zohar; Jensen, Kenneth A.; Hammel, Kenneth E.
1999. FEBS Letters. 446: 49–54.

Biochemical Approaches to Wood Preservation

Kersten, Philip J.
1995. In: Proceedings, Wood preservation in the '90s and beyond; 1994; September 26–28; Savannah, GA. Proceedings 7308. Madison, WI: Forest Products Society: 153–157.

Biochemical and Molecular Characterization of South African Strains of *Phanerochaete chrysosporium*

de Koker, Theodorus H.; Zhao, Jiong; Cullen, Dan; Janse, Bernard J.H.
1998. Mycol. Res. 102(1): 88–92.

Biomimetic Initiation of Lignol Dehydropolymerization With Metal Salts

Landucci, Lawrence; Ralph, Sally
1998. In: Lewis, Norman G.; Sarkanen, Simo, eds. Lignin and lignan biosynthesis. Proceedings, 211th national meeting of the American Chemical Society; 1996 March 24–29; New Orleans, LA. ACS Symposium Series 697. Washington, DC: American Chemical Society: 148–162.

Cloning and Disruption of the β -Isopropylmalate Dehydrogenase Gene (*LEU2*) of *Pichia stipitis* With *URA3* and Recovery of the Double Auxotroph

Lu, P.; Davis, B.P.; Hendrick, J.; Jeffries, T.W.
1998. Appl. Microbiol. Biotechnol. 49: 141–146.

Laboratory Evaluation of Chlorothalonil Formulation for Stain and Mold Control on Rubberwood and Maple

Mingliang, Jiang; Highley, Terry; Ferge, Leslie; Woods, Thomas L.
1998. In: Proceedings of the International Research Group on Wood Preservation; 29th annual meeting; 1998 June 14–19; Maastricht, The Netherlands. Stockholm, Sweden: The International Research Group on Wood Preservation. Document IRG/WP 98–30175.

A Strong Nitrogen Source-Regulated Promoter for Controlled Expression of Foreign Genes in the Yeast *Pichia pastoris*

Shen, Shigang; Sulter, Greitje; Jeffries, Thomas W.; Cregg, James M.
1998. Gene. 216: 93–102.

Anaerobic Growth and Improved Fermentation of *Pichia stipitis* Bearing a *URA1* Gene From *Saccharomyces cerevisiae*

Shi, N.-Q.; Jeffries, T.W.
1998. Appl. Microbiol. Biotechnol. 50: 339–345.

Cleavage of Nonphenolic Lignin Structures by Laccase in the Presence of 1-Hydroxybenzotriazole

Srebrotnik, Ewald; Jensen, Kenneth A., Jr.; Hammel, Kenneth E.
1998. In: Proceedings, 7th international conference on biotechnology in the pulp and paper industry; 1998 June 16–19; Vancouver, BC, Canada. Montreal, Quebec, Canada: Canadian Pulp and Pap. Assoc. Poster presentations Vol. B: B195–197.

2-Deoxyglucose as a Selective Agent for Derepressed Mutants of *Pichia stipitis*

Sreenath, Hassan K.; Jeffries, Thomas W.
1999. Davison, Brian H.; Finkelstein, Mark, eds. Proceedings, 20th symposium on biotechnology for fuels and chemicals; 1998 May 3–7; Gatlinburg, TN. Appl. Biochem. Biotechnol. 77–79: 211–222.

Fungal Cellobiohydrolases and the Degradation of Crystalline Cellulose

Teeri, Tuula T.; Cullen, Daniel; Divne, Christina; Denman, Stuart; Jones, Alwyn T.; Koivula, Anu; Linder, Markus; Ståhlberg, Jerry; Wohlfahrt, Gerd; von Ossowski, Ingemar; Zou, Jin-Yu.
1998. In: Genetics, biochemistry and ecology of cellulose degradation. Proceedings, Mie Bioforum 98, program and abstracts; 1998 September 7–11; Suzuka, Japan. Tse, Japan: Mie University: 25.

Manganese Peroxidase-Dependent Oxidation of Glyoxylic and Oxalic Acids Synthesized by *Ceriporiopsis subvermispora* Produces Extracellular Hydrogen Peroxide

Urzúa, Ulises; Kersten, Philip J.; Vicuña
1998. Appl. Environ. Microbiol. 64(1): 68–73.

***Phanerochaete chrysosporium* Cellobiohydrolase and Cellobiose Dehydrogenase Transcripts in Wood**

Vallim, Marcelo A.; Janse, Bernard J.H.; Gaskell, Jill; Pizzirani-Kleiner, Arline A.; Cullen, Daniel
1998. Appl. Environ. Microbiol. 64(5): 1924–1928.

Expression of Green Fluorescent Protein in *Aureobasidium pullulans* and Quantification of the Fungus on Leaf Surfaces

Wymelenberg, A.J. Vanden; Cullen, D.; Spear, R.N.; Schoenike, B.; Andrews, J.H.
1997. *BioTechniques* 23(4): 686–690.

Transcript Patterns of *Phanerochete Chrysosporium* Lignin Peroxidase Genes in Organopollutant-Contaminated Soils and in Wood

Van den Wymelenberg, Amber; Janse, Bernard; Gaskell Jill; Dietrich, Diane; Cullen, Dan
1998. In: Genetics and cellular biology of basidiomycetes IV. Abstracts; 1998 March 27–30; Nijmegen, The Netherlands. The Netherlands: Mushroom Experimental Station: p. 18.

Durability

Proceedings of The International Research Group of Wood Preservation, 30th annual meeting; 1999 June 6–11; Rosenheim, Germany. Stockholm, Sweden: The International Research Group on Wood Preservation

Evaluation of Wood Treated With Copper-Based Preservatives for Cu Loss During Exposure to Heat and Copper-Tolerant *Bacillus licheniformis*

Crawford, Douglas M.; Clausen, Carol A.
1999. In: Test methodology and assessment. Sec. 2. Document IRG/WP 99–20155.

Protection of Southern Pine Using N, N-Naphthaloylhydroxylamine: Field Tests, Soft-Rot Cellars and Aquatic Bioassay Leach Testing

Crawford, Douglas M.; Green, Frederick, III
1999. In: Wood Protecting Chemicals. Sec. 3. Document IRG/WP 99–30204.

Bioconversion of Wood Wastes Into Gourmet and Medicinal Mushrooms

Croan, Suki C.
1999. In: Environmental aspects. Sec. 5. Document IRG/WP 99–50129.

Targeted Inhibition of Wood Decay Fungi: Degradation of Cotton Cellulose.

Green, Frederick, III; Kuster, Thomas A.
1999. In: Biology. Sec. 1. Document IRG/WP 99–10321.

Moisture Protection for Timber Members

Blankenhorn, Paul R.; Bukowski, Steven; Kainz, James A.; Ritter, Michael
1999. In: Walford, G.B.; Gaunt, D.J., eds. Proceedings of the Pacific Timber Engineering Conference; 1999 March 14–18; Rotorua, New Zealand. New Zealand Forest Research Institute, Forest Res. Bull. 212: 240–248. Vol. 2.

Nondestructive Evaluation Techniques for Timber Bridges

Emerson, Robert N.; Pollock, David G.; Kainz, James A.; Fridley, Kenneth J.; McLean, David I.; Ross, Robert J.
1998. In: Natterer, J.; Sandoz, J.-L. Proceedings, 5th World conference on timber engineering; 1998 August 17–20; Montreux, Switzerland. Lausanne Switzerland: Swiss Federal Institute of Technology: 670–677 Vol. 1.

A Comparison of the Treatability of Southern Yellow Pine to Five Appalachian Hardwoods

Hassler, Curt C.; Slahor, Jeffrey J.; Gardner, Douglas J.
1999. *Forest Prod. J.* 49(2): 89–93.

► 1. Effect of Prestain on the Treatability of Western Hemlock With Chromated Copper Arsenate

Lebow, Stan T.; Halverson, Steven A.
1999. USDA Forest Serv. Res. Note FPL–RN–0269. 5 p.

To enhance the appearance of the treated product, a stain is often sprayed onto western hemlock lumber prior to treatment with chromated copper arsenate (CCA-C). There is concern that this stain might interfere with the penetration and retention of CCA-C during the subsequent pressure treatment. This study compared the penetration and retention of CCA-C in prestained and unstained end-matched specimens of western hemlock lumber.

Two-Stage Moisture Diffusion in Wood With Constant Transport Coefficients

Liu, Jen Y.; Simpson, William T.
1999. *Drying Technol.* 17(1&2): 257–269.

► 2. Inspection of Timber Bridges Using Stress Wave Timing Nondestructive Evaluation Tools—A Guide for Use and Interpretation

Ross, Robert J.; Pellerin, Roy F.; Volny, Norbert; Salsig, William W.; Falk, Robert H.
1999. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–114. 15 p.

This guide was prepared to assist inspectors in the use of stress wave timing instruments and the various methods of locating and defining areas of decay in timber bridge members. The first two sections provide (a) background information regarding conventional methods to locate and measure decay in timber bridges and (b) the principles of stress wave nondestructive testing and its measurement techniques. The last section is a detailed description of how to apply the field use of stress wave nondestructive testing methods. A sample field data acquisition form and additional reference material are included in the Appendix. This guide includes all the information needed to begin to utilize and interpret results from stress wave timing nondestructive evaluation methods.

Flattening Wavy Eucalyptus Veneer During Finish-Drying

Steinhagen, H. Peter; Rozas, Carlos; Knattabi, Abdellatif; Loehnertz, Stephen P.; Poblete, María Jesús
1999. *Forest Prod. J.* 49(1): 63–66.

Issues Related to Venting of Attics and Cathedral Ceilings

TenWolde, Anton; Rose, William B.
1999. CH-99-11-4. ASHRAE Trans. 105(1): 1–7.

Tolerance of *Wolfiporia cocos* Isolates to Copper in Agar Media

Woodward, Bessie; De Groot, Rodney.
1999. *Forest Prod. J.* 49(4): 87–94.

General

When Good Confidence Intervals Go Bad: Predictor Sort Experiments and ANOVA

Verrill, Steve
1999. *The American Statistician.* 53(1): 38–42.

Papermaking and Paper Recycling

Assignment of the Photoyellowing-Related 1675 cm^{-1} Raman/IR Band to p-Quinones and Its Implications to the Mechanism of Color Reversion in Mechanical Pulps

Agarwal, Umesh P.

1998. *J. Wood Chem. Technol.* 18(4): 381–402.

Commercialization of Biopulping for Mechanical Pulping

Akhtar, Masood; Scott, Gary M.; Lentz, Michael J.; Horn, Eric; Swaney, Ross E.; Kirk, T. Kent

1998. *In: Proceedings, 7th international conference on biotechnology in the pulp and paper industry; 1998 June 16–19; Vancouver, BC Canada. Montreal, Quebec, Canada: Canadian Pulp and Pap. Assoc. Oral presentations Vol. A: A55–A58.*

Flexographic Newspaper Deinking: Treatment of Wash Filtrate Effluent by Membrane Technology

Chabot, Bruno; Krishnagopalan, Gopal A.; Abubakr, Said
1997. *In: Proceedings, 4th research forum on recycling; 1997 October 7–9; Quebec, Canada. Montreal, Canada: Canadian Pulp and Paper Association: 233–242.*

Properties of Nonwood Fibers

Han, James S.

1998. *In: Proceedings of the Korean Society of Wood Science and Technology annual meeting; 1998 April 24–25; Seoul, Korea. Seoul, Korea: The Korean Society of Wood Science and Technology: 3–12.*

Types and Amounts of Nonwood Fibers Available in the U.S.

Rowell, R.M.; Cook, C.

1998. *In: Proceedings, 1998 Tappi, North American nonwood fiber symposium; 1998 February 17–18; Atlanta, GA. Atlanta, GA: TAPPI PRESS. 5 p.*

New Technology for Papermaking: Biopulping Economics

Scott, Gary M.; Swaney, Ross

1998. *Tappi J.* 51(12): 153–157.

Degradation of Pulp-Mill Effluent by Oxygen and $\text{Na}_5[\text{PV}_2\text{Mo}_{10}\text{O}_{40}]$, a Multipurpose Delignification and Wet Air Oxidation Catalyst

Sonnen, Daniel M.; Reiner, Richard S.; Atalla, Rajai H.; Weinstock, Ira A.

1997. *Ind. Eng. Chem. Res.* 36 (10): 4134–4142.

Deposition Analysis of Pressure Sensitive Adhesives

Venditti, Richard A.; Zhang, C.; Buchanan, C.G.;

Gilbert, Richard D.; Abubakr, Said; Bormett, David

1998. *In: Deposition analysis of pressure sensitive adhesives. Proceedings, Tappi, 1998 recycling symposium; 1998 March 8–12; New Orleans, LA. Atlanta, GA: TAPPI Press: 475–482.*

Properties and Use of Wood, Composites, and Fiber Products

Proceedings of the 5th world conference on timber engineering; 1998 August 17–20; Montreux, Switzerland.

Natterer, J.; Sandoz, J.-L., eds

1998. Lausanne Switzerland: Swiss Federal Institute of Technology.

An Overview of the Wood in Transportation Program in the United States

Duwadl, Sheila Rimal; Ritter, Michael A.; Cesa, Edward
1998. 1: 32–38.

Roof Systems: Light Frame Truss System Analysis

Gjinolli, Argon E.; Wolfe, Ronald W.; Misini, Misin; Pillana, Nebi

1998. 1: 796–797.

Temperature Corrections for Mechanically Graded Lumber

Green, David W.; Evans, James W.; Logan, James D.; Allen, Jim

1998. 2: 844–845.

Determining Mode I and II Contributions in End Notched Beams

Hermanson, John; Soltis, Lawrence; Rammer, Douglas

1998. 2: 836–837.

Analysis of Strain in Finger-Jointed Lumber

Hernandez, Roland

1998. 1: 145–152.

Statistical Characterization of Non-Linear Elastic Properties

Hernandez, Roland; Rammer, Douglas R.

1998. 2: 834–835.

Effect of Cold Temperatures on Stress-Laminated Timber Bridge Decks

Kainz, James A.; Ritter, Michael A.

1998. 2: 42–49.

Moire Analysis of the Modified Arcan Shear Specimen

Rammer, Douglas R.; Hernandez, Roland

1998. 2: 840–841.

In-Place Shear Strength of Wood Beams

Rammer, Douglas R.; McLean, David I.; Cofer, William F.

1998. 1: 207–214.

Withdrawal and Lateral Strength of Threaded Nails

Rammer, Douglas R.; Bender, Donald A.; Pollock, David G.

1998. 2: 238–245.

Evaluation and Testing of Timber Railroad Bridges

Ritter, Michael A.; Wipf, Terry J.; Wood, Douglas, L.

1998. 1: 792–793.

Proceedings of the Pacific timber engineering conference; 1999 March 14–18; Rotorua, New Zealand. New Zealand Forest Research Institute.

Walford, G.B.; Gaunt, D.J., eds.
1999. Forest Res. Bull. 212.

The Properties of Lumber and Timber Recycled From Deconstructed Buildings

Falk, Robert H.
1999. 2: 255–257

Crashworthy Railing for Timber Bridges

Ritter, Michael A.; Faller, Ronald K.; Duwadi, Sheila Rimal
1999. 3: 325–332

Stress-Laminated SCL Bridges With Prestressing Strand

Ritter, Michael A.; Smith, Matthew S.; Wipf, Terry J.
1999. 3: 47–54.

Dynamic Evaluation and Testing of Timber Highway Bridges

Wipf, Terry J.; Ritter, Michael A.; Wood, Douglas L.
1999. 3: 333–340.

Trussed Assemblies From Small-Diameter Round Timbers

Wolfe, Ronald W.; Hernandez, Roland
1999. 1: 251–256.

Bending Properties of STP-Laminated Wood Girders

Bohnhoff, D.R.; Williams, G.D.; Moody, R.C.
1998. In: Proceedings, 1998 ASAE annual international meeting; 1998 July 12–16; Orlando, FL. Pap. No. 984015. St. Joseph, MI: ASAE: 14 p.

Microstructure and Dynamic Fracture Toughness of Polypropylene Reinforced With Cellulose Fiber

Clemons, Craig M.; Giacomini, A. Jeffrey; Caulfield, Daniel F.
1998. In: Materials. Proceedings of the SPE ANTEC conference; 1998 April 26–30; Atlanta, GA. Brookfield, CT: Soc. of Plastics Eng.: 1432–1436. Vol. 2.

GRP Prestressing of Wood Decks

Dagher, Habib J.; Abdel-Magid, Beckry; Ritter, Michael; Iyer, Srinivasa
1997. In: Kempner, Leon, Jr.; Brown, Colin B., eds. Building to last. Proceedings of structures congress 15; 1997 April 13–16 Portland, OR: 585–589. Vol. 1.

Flakeboard Thickness Swelling. Part II. Fundamental Response of Board Properties to Steam Injection Pressing

Geimer, Robert L.; Kwon, Jin Heon
1999. Wood Fiber Sci. 31(1): 15–27.

Strength and Processing Properties of Wet-Formed Hardboards From Recycled Corrugated Containers and Commercial Hardboard Fibers

Hunt, John F.; Vick, Charles B.
1999. Forest Prod. J. 49(5): 69–74.

Wheat Straw as a Reinforcing Filler in Plastic Composites

Johnson, Donna A.; Jacobson, Rod; MacLean, W. Dan
1997. In: Proceedings, 4th international conference on woodfiber-plastic composites; 1997 May 12–14; Madison, WI. Madison, WI: Forest Products Society: 200–205.

- ▷ **3. Structural Lumber Properties of Hybrid Poplar**
Kretschmann, David E.; Isebrands, J.G.; Stanosz, Glen; Dramm, John R.; Olstad, Adele; Cole, David; Samsel, Jay
1999. USDA Forest Serv. Res. Pap. FPL–RP–573. 8 p.

The objective of this study was to investigate the mechanical and physical properties of the Wisconsin-5 hybrid poplar clone and compare those properties with previously full-size (In-Grade) properties of native aspen and cottonwood.

- ▷ **4. Creep and Creep–Rupture Behavior of Wood-Based Structural Panels**

Laufenberg, Theodore L.; Palka, L.C.; McNatt, J. Dobbin
1999. USDA Forest Serv. Res. Pap. FPL–RP–574. 20 p.

The objectives of this baseline study of flexural creep and creep–rupture in wood-based panel products were to use standardized test methods to provide a consistent set of theological properties for a wide range of wood-based structural panels, use analytical methods for describing and predicting panel behavior, and guide future research in panel rheology.

Verification of a Kinetics-Based Model for Long-Term Effects of Fire Retardants on Bending Strength at Elevated Temperatures

Lebow, Patricia K.; Winandy, Jerrold E.
1999. Wood Fiber Sci. 31(1): 49–61.

Influence of Cambial Age and Growth Conditions on Microfibril Angle in Young Norway Spruce (*Picea abies* [L.] Karst.)

Lindström, Håkan; Evans, James W.; Verrill, Steve P.
1998. Holzforschung 52(6): 573–581.

Natural Fibers in Resin Transfer Molded Composites

O'Dell, Jane L.
1997. In: Proceedings, 4th international conference on woodfiber-plastic composites; 1997 May 12–14; Madison, WI: Forest Products Society: 280–285.

Parallel-to-Grain Dowel-Bearing Strength of Two Guatemalan Hardwoods

Rammer, Douglas R.
1999. Forest Prod. J. 49(6): 77–87.

- ▷ **5. Plans for Crash-Tested Bridge Railings for Longitudinal Wood Decks on Low-Volume Roads**

Ritter, Michael A.; Faller, Robert K.; Bunnell, Steve; Lee, Paula D. Hilbrich; Rosson, Barry T.
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–107. 12 p.

The plans for crashworthy bridge railing for low-volume roads were developed through a cooperative research program involving the USDA Forest Service, Forest Products Laboratory; the Midwest Roadside Safety Facility, University of Nebraska–Lincoln; and the Forest Service, National Forest System, Engineering. Three railings were developed and successfully tested in accordance with National Cooperative Highway Research Program Report 350 Test Level-1 requirements. The fourth system was developed for a lower test level based on criteria developed by the Forest Service for single-lane bridges on very low-volume roads. For convenience, full drawing sets are provided in customary U.S. and S.I. units.

► **6. Plans for Crash-Tested Wood Bridge Railings for Concrete Decks**

Ritter, Michael A.; Faller, Robert K.; Lee, Paula D. Hilbrich; Rosson, Barry T.; Duwadi, Sheila Rimal
1998. USDA Forest Serv. Gen. Tech. Rep. FPL-GTR-108. 18 p.

As part of continuing cooperative research between the Midwest Roadside Safety Facility; the USDA Forest Service, Forest Products Laboratory; and the Federal Highway Administration, several crashworthy wood bridge railings and approach railing transitions have been adapted for use on concrete bridge decks. These railings meet testing and evaluation criteria outlined in National Cooperative Research Performance Evaluation of Highway Features and include a glued-laminated timber (glulam) rail, with and without a curb. In adapting the railings from a wood deck to a concrete deck, the critical consideration was railing attachment to the deck. A comparable connection was obtained by an analysis of maximum loads measured by field instrumentation during crash testing or by equating the ultimate capacity of connections used on the wood deck to those required for a concrete deck. For convenience, full drawing sets are provided in customary U.S. and S.I. units.

Jute and Kenaf

Rowell, Roger M.; Stout, Harry P.
1998. *In*: Lewin, Menachem; Pearce, Eli M., eds. Handbook of fiber chemistry. 2d ed. New York, NY: Marcel Dekker, Inc.: 465–504. Chap. 7.

Applications of Jute in Resin Transfer Molding

Rowell, Roger; O'Dell, Jane; Basak, R.K.; Sarkar, M.
1997. *In*: Proceedings, International seminar on jute and allied fibres: changing global scenario; Calcutta, India. Calcutta, India: Ijira Association: 89–96.

Steam Stabilization of Jute-Based Composites

Rowell, Roger; Lange, Sandra; Todd, Tom; Das, S.; Saha, A.K.; Choudhury, P.K.; Inoue, Masafume.
1997. *In*: Jute India; 1997 October 20–22; New Dehli, India. Calcutta, India: Ijira Publishers: 97–108.

Highly Filled Lignocellulosic Reinforced Thermoplastics: Effect on Interphase Modification

Sanadi, Anand R.; Feng, Daan; Caulfield, Daniel F.
1997. *In*: Andersen, S.I.; Brondsted, P.; Liholt, H.; Lystrup, Aa.; Rheinländer, J.T.; Sorensen, B.F.; Toftgaard, H., eds. Polymeric composites—expanding the limits. Proceedings, 18th Riso international symposium on materials science; Roskilde, Denmark. Roskilde, Denmark: Riso National Laboratory: 465–470.

Localized Notch Reinforcement for Wooden Beams

Soltis, Lawrence A.; Ross, Robert J.; Rammer, Douglas R.
1998. U.S. Patent 5,852,909. Dec. 29, 1998.

Wood Fiber Derived From Scrap Pallets Used in Polypropylene Composites

Stark, Nicole M.
1999. Forest Prod. J. 49(6): 39–46.

Analytical Approach to Determining the Effects of Incising on Bending Strength and Stiffness of Glued Laminated Beams

Winandy, Jerrold E.; Hernandez, Roland
1998. *In*: Proceedings, 94th annual meeting, American Wood-Preservers' Association; 1998 May 17–19; Scottsdale, AZ. Granbury, TX: American Wood-Preservers' Association: 98–115.

Recycling of Wood Products

Evaluation of Lumber Recycled From an Industrial Military Building

Falk, Robert H.; Green, David; Lantz, Scott C.
1999. Forest Prod. J. 49(5): 49–55.

Durability and Strength of Cement-Bonded Wood Particle Composites Made From Construction Waste

Wolfe, Ronald W.; Gjinolli, Agron
1999. Forest Prod. J. 49(2): 24–31.

Surface Chemistry

Terpene Emissions From Particleboard and Medium-Density Fiberboard Products

Baumann, Melissa G.D.; Batterman, Stuart A.; Zhang, Guo-Zheng
1999. Forest Prod. J. 49(1): 49–56.

The Effect of Soy Protein Additions on the Reactivity and Formaldehyde Emissions of Urea-Formaldehyde Adhesive Resins

Lorenz, Linda F.; Conner, Anthony J.; Christiansen, Alfred W.
1999. Forest Prod. J. 49(3): 73–78.

Effect of Water Repellents on Long-Term Durability of Millwork Treated With Water-Repellent Preservatives

Williams, R. Sam
1999. Forest Prod. J. 49(2): 52–58.

► **7. Selection and Application of Exterior Stains for Wood**

Williams, R. Sam; Feist, William C.
1999. USDA Forest Serv. Gen. Tech. Rep. FPL-GTR-106. 9 p.

Exterior stains for wood protect the wood surface from sunlight and moisture. Because stains are formulated to penetrate the wood surface, they are not prone to crack or peel as can film-forming finishes, such as paints. This publication describes the properties of stains and wood, methods for applying stains, and the expected service life of stains.

► **8. Water Repellents and Water-Repellent Preservatives for Wood**

Williams, R. Sam; Feist, William C.
1999. USDA Forest Serv. Gen. Tech. Rep. FPL-GTR-109. 12 p.

Water repellents and water-repellent preservatives increase the durability of wood by enabling the wood to repel liquid water. This report focuses on water-repellent finishes for wood exposed outdoors above ground. The report includes a discussion of the effects of outdoor exposure on wood, the characteristics of water repellent and water-repellent preservative formulations, and methods for applying these finishes.

Timber and Fiber Demand and Technology Assessment

Proceedings, Society of American Foresters national convention; 1998 September 19–23; Traverse City, MI. Bethesda, MD: Society of American Foresters.

Long-Range Outlook for U.S. Paper and Paperboard Demand, Technology, and Fiber Supply-Demand Equilibria

Ince, Peter J.
1999. 330–343.

An Update of Timber Certification: Potential Impacts on Forest Management

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Optimizing Uneven-Aged Management of Loblolly Pine Stands

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► 9. SouthPro: A Computer Program for Managing Uneven-Aged Loblolly Pine Stands

Schulte, Benedict; Buongiorno Joseph; Lin, Ching-Rong; Skog, Kenneth
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–112. 47 p.

SouthPro is a Microsoft Excel add-in program that simulates the management, growth, and yield of uneven-aged loblolly pine stands in the southern United States. This manual provides suggestions for working with Excel, describes program installation and activation of SouthPro, and gives background information on the SouthPro growth model. The manual includes a comprehensive tutorial that explains how to start the program; enter simulation data; generate BDq distributions; add, delete, and retrieve setup files; execute single and multiple simulations; plot summary statistics; and produce stock-and-cut tables and marking guides.

Veneered Panels—A Horn of Plenty, But Who Will Blow It?: Coping With Plywood's Cost-Price Squeeze

Spelter, Henry; Ince, Peter
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Wood Chemistry

A Staining Technique for Evaluating the Pore Structure Variations of Microcrystalline Cellulose Powders

Yu, Xiaochun; Atalla, Rajai H.
1998. Powder Technol. 98: 135–138.

Special Item

Wood Handbook: Wood as an Engineering Material

Forest Products Laboratory. 1999. USDA Gen. Tech. Rep. FPL–GTR–113. 463 p.

This reference has been updated and expanded since the last issue in 1987. *The Wood Handbook* provides manufacturers and users of wood products with current information on a wide range of subjects including basic wood and wood product characteristics and properties, various wood product manufacturing processes, processes to enhance the performance of wood and wood products, structural design information, specifications and rules for the proper use of wood products, and numerous other areas of interest.



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